REMARKS/ARGUMENTS

Claims 1, 3, 5-7 and 9, 10, 13-16 remain pending.

Claims 11, 12 were cancelled by this response.

Claims 1, 3, 9, 10, 15, 16 were amended to better clarify the scope of the invention. No new matter has been added.

Attached are :

- a publication referenced as "**Journal of Materials Processing Technology** Volume 106, Issues 1-3, 31 October 2000, Pages 123-130";
- an automatic translation of the European Patent 1182420A1 to Lanz, obtained from "esp@cenet®".

Drawings

The drawings are objected to under 37 CFR 1.83(a).

Corrected drawings were required.

Considering the oblong bores, this feature is cancelled from claim 9.

Considering the series of inner layers and outer plates, claims 11 and 12 are cancelled.

Rejections Under 35 USC 102(b)

Claims 1 and 13 were rejected under 35 USC §102(b) as being anticipated by U.S. Patent No. 5,471,905 to Martin (hereinafter "the '905 Patent"). The '905 Patent discloses a structural armour component. However, the '905 does not disclose a second inner layer being made from a hard material, harder and less ductile than a first ductile material (as a consequence different therefrom), to stop projectiles that passed through the first outer plate made of said first ductile material. As disclosed in the '905 Patent, each of the face sheets 110, 120 of the structural members 100 has the same material (specifically a titanium alloy; lines 39-44 column 2).

The '905 Patent discloses a harder material for the core element 130 and its cells—not an inner layer.

Accordingly, the '905 Patent does not disclose "the second hard material (the inner layer is made from) being harder and less ductile than said first ductile material" as recited in Claim 1 as amended.

Further, the '905 Patent does not disclose "fixing means for detachably fixing the outer plate to the inner layer at the location of the spacers." Each of the face sheets 110, 120 is welded to the core element 130.

As a consequence, the '905 Patent clearly does not disclose all the elements of Claim 1.

Regarding claim 13, as previously presented, it is not anticipated since it depends from claim 1.

Rejections Under 35 USC 102(a)

Claims 1,7,15 and 16 were rejected under 35 USC §102(a) as being anticipated by the European Patent 1182420A1 to Lanz (hereinafter "the EP '420 Patent").

Attached is an automatic translation into English of the EP '420 Patent.

The EP '420 Patent discloses a structural armour component. From paragraphs 1-3 and 21-25 of the EP '420 Patent, the inner layer (1) should be an element of the chassis and is weldable to mounting plates 4.1, 4.2. As a consequence, it is made from metal, as the chassis in year 2000 were mostly (typically steel).

The attached publication dated October 2000 and referenced as "**Journal of Materials Processing Technology**..." discloses that hot deformable carbon steel exists.

However, versus claim 1, neither the EP '420 Patent, nor the above-cited publication, disclose a second inner layer (1) being made from a hard material, harder and less ductile than a first ductile material of an outer metal plate (2) and, as a consequence, different from said first ductile material.

Paragraph 24 of the EP '420 Patent discloses: "By the deformation of the metal plate..." (2). However such a deformation is not mentioned as made plastically without fracture, since it "affects the connection with the mounting plates 4.1, 4.2".

As a consequence, the EP '420 Patent does not disclose an outer metal plate (2) made from a material which can be deformed plastically without fracture (viz. a ductile material).

Further, the EP '420 Patent does not disclose a second inner layer (1) being made from a hard material, harder and less ductile than the ductile material of the outer metal plate (2).

On the contrary, paragraph 23 of the EP '420 Patent discloses: "By the deformation of the metal plate 2 with the action for example an exploding mine shortened itself these. 4,2 affects the connection-lax metal plate 2 the mounting plates 4,1 and. From this reason the mounting plates must become 4,1 and 4,2 such solid formed that they can resist these force effects and introduce the simultaneous forces into the side walls 5,1 and 5,2 and in a smaller measure into the ground 1".

As a consequence, said force is essentially supported/absorbed by the so-called "mounting plates 4,1 and 4,2 and side walls 5,1 and 5,2". Such a combination of mounting plates/side walls is not provided in the invention as claimed in claim 1, in which the effort is essentially supported/absorbed by means of the different mechanical features provided by the difference of materials between the inner layer (1) and the outer metal plate (2) : higher hardness and less ductility for the material of said second inner layer (1) versus the outer metal plate (2).

Moreover, considering claim 15 as amended, the EP '420 Patent does not disclose an outer plate (2) which is free of ribs. The " connection-lax" 7 defines a rib, with a view to providing a mechanical support in the immediate vicinity of the mounting plates 4,1 and 4,2 and the connection. Paragraph 26 even specifies that "the connection-lax 7 introduced, which vertical turns off to the major surface of the metal plate 2 and in their form of complementary to the recess 6 formed is". Such a complementary form improves the transmission of effort between the metal plate (2) and the mounting plates 4,1 and 4,2.

In claim 15, since the outer plate (2) is free of ribs, there is no transmission of effort by means of either such cooperating ribs and recesses (6,7) or bar 13 which comes into contact with ground 1, in the EP '420 Patent.

Contrarily to the solution disclosed in EP '420 Patent, and as above-mentioned, the effort is, through the solution disclosed in claim 15, essentially supported/absorbed by means of the mechanical difference between the inner layer (1) and the outer metal plate (2): higher hardness and less ductility for the material of said second inner layer (1) versus the outer metal plate (2).

Furthermore, the EP '420 Patent does not disclose:

"fixing means for detachably fixing the outer plate to the inner layer at the location of the spacers, said fixing means extending through said bores and through holes of the outer plate, at least some of said bores and holes loosely receiving said fixing means for enabling differential expansion of said outer plate and inner layer when the temperature changes."

In fig. 2a of the EP '420 Patent (and paragraph 26), the complementary forms of recess 6 and the connection-lax 7 absorbs the force and effort. As a consequence, screw 8 is closely engaged in the receiving holes of the mounting plate 4,1 and metal plate 2.

In figs. 3a/b/4 of the EP '420 Patent (and paragraphs 32/34), the mechanical strength of support 9 and bypass in the side wall 5.1 absorbs the force and effort of explosion. As a consequence, screw 12 is either closely engaged in the receiving holes of the support 9 and metal plate 2 (as illustrated), or changed in "a spring pin or something similar".

It is to be noted that even if such a spring pin is used, the "elasticity" of pin 12 is then parallel to the axis of the pin, while enabling differential expansion of metal plate 2 / and ground 1 when the temperature changes would request a free movement transverse to said axis. As a consequence, the EP '420 Patent discloses no solution for enabling differential expansion of the metal plate 2 and ground 1 when the temperature changes.

Considering claims 7 and 16, they are not anticipated since they depend from claims 1 and 15, respectively.

Rejections Under 35 USC 103(a)

Claim Rejections Under 35 USC 103(a) Over Martin

Claim 5 was rejected under 35 USC §103(a) over the '905 Patent to Martin.

However, the materials disclosed in the '905 Patent are very specific, all the since these materials must be the same.

According to the '905 Patent, both the outer and inner plates 110, 120 must be made of the same material defined as titanium alloy.

Claim Rejections Under 35 USC 103(a) Over Lanz

Claims 6, 9-12 were rejected under 35USC 103(a) as being unpatentable over European Patent 1182420A1 to Lanz (hereinafter "the EP '420 Patent").

Regarding Claim 6, the EP '420 Patent does not disclose the spacers (9,16) being a hollow tubular shape.

In the EP '420 Patent, forming said spacers as a hollow tubular shape is prevented since :

- in fig.2a of the EP '420 Patent (and paragraph 26), the spacers 4.1, 4.2 must be a non-hollow solid shape, with a view to allowing the complementary forms of recess 6 and the connection-lax 7 to absorb the force and effort,.

- in figs.3a/b (and paragraph 32), the mechanical strengths of support 9 and "connection-lax 11" (viz. close engagement of support 9 in the recess formed laterally by ground 1, bar 13 and lateral extension of plate 2) prevent the support 9 from being a hollow tubular shape, and,

- in fig.4 (and paragraph 34), the same "connection-lax 11" (viz. close engagement of support 16 in the recess formed laterally by ground 1, bar 13 and lateral extension of plate 2) also prevents said support from being a hollow tubular shape

Regarding Claim 9, the EP '420 Patent does not disclose : "the outer plate having holes for the passage of the fixing means therethrough, at least some of said holes loosely receiving said fixing means for enabling differential expansion of said outer plate and inner layer when the temperature changes".

Fixing means (12) are closely received into holes and no differential expansion of metal plate (2) and ground (1) when the temperature change is enabled. No solution for enabling differential expansion of said outer plate and inner layer when the temperature changes is disclosed

Considering claim 10, it is not anticipated since they depend from claim 9.

Further, claim 9 as amended now specifies that at least some of the holes of the outer plate are loosely receiving the fixing means (used for detachably fixing the outer plate to the inner layer at the location of the spacers) for enabling differential expansion of said outer plate and inner layer when the temperature changes.

Such features are disclosed page 3 lines 3-6 of the specification as filed. As a consequence no new matter was added.

Claim Rejections under 35 USC 103(a) over Lanz and further in view of Ladika

Claims 3 and 14 were rejected under 35 USC §102(a) as being anticipated by European Patent 1182420A1 to Lanz (hereinafter "the EP '420 Patent") and Ladika (hereinafter "the '520 Patent").

Regarding claim 3, as amended, limitations have been added to the conducting element. More particularly, the claim now requires that the conducting elements are "separate from the outer plate, said conducting elements being detachably fixed to said outer plate and extending between the outer plate and the inner layer to provide electrical continuity between the outer plate and the inner layer, each conducting element having a bore." The EP '420 Patent does not disclose conducting elements 13, separate from the outer plate 2 and detachably fixed thereto. Since connecting elements 13 are integral with plate 2, the connecting elements further have no bore, and no attachment screws are disposed in the bores at the distance from the inner layer 1 for fixing the conducting elements to the outer plate 2.

Regarding claim 14, as previously presented, it is not anticipated since it depends from claim 3. Further, the conducting elements (13) of the EP '420 Patent are not flexible to enable differential dilatations between the outer plate and the inner layer. Bar 13 must be solid and rigid since it laterally stops the "connection-lax 11" (paragraphs 32-36).

Furthermore in the '520 Patent, the block of resilient material (264) is not a conducting element adapted to provide electrical continuity between the outer plate (46) and the inner layer (114).

Conclusion

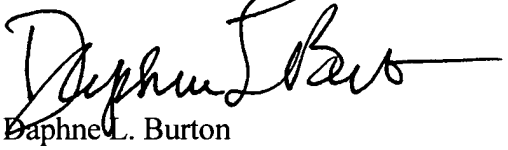
The undersigned respectfully submits that this application is in condition for allowance. Early and favorable reconsideration and allowance of this application is respectfully requested. If any outstanding issues might be resolved by an interview or an Examiner's amendment, the Examiner is invited to call the representative of the assignee of the entire interest of this application at the telephone number shown below.

This response is filed within four months from the mailing date of the office action. Accordingly, Assignee has attached a check in the amount of $130 for a one

month extension. A petition for extension of time under 37 C.F.R. 1.136 is also hereby made.

Respectfully submitted,

BURTON IP LAW GROUP



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Warm deformation of carbon steel

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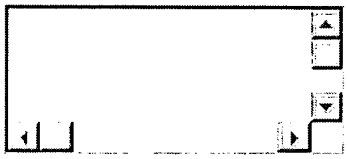
Abstract

The stress and structure of carbon steels during deformation at elevated temperature was investigated. Below the austenite range, concurrent cementite dissolution, ferrite oversaturation, heteromorphous cementite precipitation and coagulation together with dynamic recovery and recrystallization of the matrix determine the structure and stress level during deformation and, finally, the structure and properties of the steel after deformation.

Author Keywords: Carbon steel; Warm deformation; Stress; Structure



Technical field

[0001] The invention relates to an arrangement to the protection of a vehicle against the action of an explosive, in particular a mine, whereby at least a laminar protective element outside is to chassis of the vehicle attached.

State of the art

[0002] The protection before mines with vehicles, in particular with tanks is for the safety of the occupants and combat effectiveness preservation, in particular with minesweepers of relevant importance. To the improvement of the protection there were already most diverse approaches. For example the ground became and/or. the entire drip tray of the too protective vehicle amplified. This made by a Aufdopplung of the floor plate with a metal plate or by use of a floor plate with a larger thickness than it from constructional reasons regarding the type of the vehicle necessary is.

[0003] Since the vehicles, becomes aimed for which such a mine protection, should be more insertable in each type of area, arise due to this use often damages at the attachment of the arranged protection. A protection damaged by so called "mounting" is only conditional ones with the prior art systems, and to replace if at all only aufwändig. Arising forces become more other, which destroys only unsatisfactory ones for example with an explosion of a mine to arise, so that in most cases despite the arrangement of a protection larger damages at the underside of the vehicles develop, which can make the vehicles in need of repair.

[0004] All prior art systems do not satisfy for the present and future situation.

Representation of the invention

[0005] Object of the invention is it to fasten a protective element in such a manner to the outside of a vehicle that on the one hand an optimal protection of the vehicle is ensured against an action of an explosive, and on the other hand the protective element prefered is also more replaceable.

[0006] The solution of the object is 1 defined by the features of the claim. According to the invention becomes at least the protection of a vehicle against an action of an explosive, in particular a mine a laminar protective element outside at that chassis of the too protective

vehicle attached. (Bottom chassis becomes in this sense a strong structural member of the vehicle, z. B. the soil /Seitenwandkonstruktion of the vehicle understood.) the protective element becomes in such a manner at that chassis attached that and first the deformation forces acting arising with an explosion of an explosive on the protective element to entire chassis it is led up in such a manner that a higher load capacity achieved as if only the protective element these forces alone will take over would have. Thus if the forces are so large that the protective element becomes substantial deformed, these high forces are to become at least partly into chassis the initiated, however in a manner, who does not lead chassis to a damage. This can imagine one in such a way that that becomes chassis only elastically deformed one, even if the protective element becomes at least partial plastic deformed.

[0007] With this type that helps the attachment chassis with the destruction of the deformation energy. In particular tanks exhibit a tub-shaped ground, so that the attachment can push away at the side walls of the tub-shaped ground. By behavior chassis, which is more comparable with an torsion-inertial, can higher deformation forces by vehicle taken over, than this is with the conventional arrangements, with which the protective elements direct at the ground mounted to become, the case. Straight because that is chassis as whole strong as the actual protective element formed, can high forces is taken over and simultaneous plastic deformations at the protective element become in such a manner reduced that from it resultant damages become minimized.

[0008] With the protective element it preferably concerns a plate shaped metal element. It is also the use of other materials for example such more conceivable on plastic basis, if they can take up in the concrete case to expecting explosion loads in the desired level.

[0009] Preferably the protective element becomes more replaceable and/or. more releasable at chassis the attached. In particular it should be possible that the user of the vehicles the protective elements fasten effort and few handles with small and/or. replacement can. So the protective elements can become depending upon need mounted and disassembled. Become the vehicles for example used in safe situations (like z. B. when shifting a location to others), the protective elements can become disassembled, which for example the fuel consumption of the vehicles reduced. If a protective element became damaged, this without larger effort replaced can become. Preferably the attachment of the protective elements becomes in such a manner designed that the protective elements also disassembled to become to be able, if deformations arose. (For example connection-lax slots can be provided. in the mounting plates or) natural are also applications more conceivable, with which and possibly only is an attachment meaningful releasable put on in the long term with special effort. To mention is for example the armament of older vehicles.

[0010] To chassis are usually several mounting plates provided, which fix that at least protective element. The mounting plates become for example from cast steel, forging steel or similar one manufactured. With special vehicles, which particular conditions bottom for uses are as for example in spaces with aggressive surroundings provided, also special steel can become such as hardened steel used. Preferably these mounting plates are in a direction parallel to a major surface of the protection element arranged. Thus shifting of the protective elements becomes to a large extent prevented with their loads in parallel direction their major surface, which in particular for the use of the vehicles in the area of importance is. The mounting plates become in a preferable embodiment at chassis the welded. Besides also an attachment of the mounting plates with other means is as for example more executable with

screws. It should be paid attention to the fact that required during the explosion load the screws themselves are not for the transmission. This knows z. B. thus achieved that to chassis are outside particular forms formed, with which the mounting plates positive will cooperate can. The embodiment of the mounting plates is on the one hand of the outside embodiment chassis and on the other hand from the constructional formation of the attachment dependent. The per large forces are, which by the support into chassis must be the passed to become to have, the more solid the support formed. The arrangement of the mounting plates is so designed that during mounting the vehicle in the area the protective element is not away-torn. So that this condition becomes met, the mounting plates (z become. B. by positive or actuated constructions) in such a manner formed that they transfer mainly to such case arising forces and that in second line the securing means are only stressed. Preferably possible present, projecting members chassis, is shared so that movements of the protective elements, which work in parallel direction to their major surface, become to a large extent impeded.

[0011] The protective element becomes fixed with securing means at the mounting plates. Preferably it concerns with these securing means screws. There is also different means as for example feather/spring pins or similar one conceivable, in particular if a releasable connection develops, with which the protective elements replaced to become to be able. The mounting plates are the other one in such a manner constructed that the securing means remain in the case of an action of an explosive essentially unloaded. Thus the used securing means must become only on the load forces dimensioned, which result from the fixation or the protective elements (essentially the dead weight of the protection element) and not on those very many higher forces, which for example an explosion of an explosive caused.

[0012] Since the protective elements become only if necessary, for example during a manoeuvre or mounted with a combat mission, outside at the vehicle, a simple assembly is prefered. This is natural in particular of importance if it concerns to attach the protective elements at the particularly inaccessible underside of the vehicle. With an assembly at a lateral wall for example this problem does not arise usually. Becomes for example the protective element at (horizontal) the underside of the vehicle attached, the made assembly in a vertical direction (and/or. vertical for the driving direction of the vehicle). In a variant in addition is also an insert or the protective elements in a direction of the provided, which lies in the main plane of the protection element. Related to the direction of travel of the vehicle thus an insertion can from the front and/or. from in the back provided its.

[0013] The dimensions of the protective elements become z. B. the corresponding present space conditions and the geometry chassis of the so selected that the protective elements between the wheels mounted to become to be able. So that the plates (which consist typically of metal) also as protective elements to work can, they must have a certain thickness. The total weight depends thereby on the surface of the plate. Preferably it is made certain that a single protective element is only so large that it with simple apparatuses (z. B. portable lifting equipment) into the assembly position brought will can. The per light protective elements formed are, the simpler become the assembly. Particularly the alignment, D. h. the positioning becomes substantial simplified with a relatively easier weight of the protective elements. If the protective element is to take for example the ground off of the vehicle, it is preferably at least as large that it is enough from a side of the vehicle to the other one, so that the securing means mounted to become to be able, without the user the bottom vehicle must creep. With several immediate next to each other arranged protective elements the whole ground can become covered. Of course it is also more conceivable that itself the single protective element from the rear to the front of the vehicle extended. In the pushed in state the protective

elements with a separate lifting device toward chassis the raised to it in the position will be that them at the mounting plates fixed to become to be able.

[0014] The mounting plates are in such a manner formed that they can take up at that or at the protective elements formed connecting elements. In a preferable embodiment the support is provided with a slot, into which a corresponding connecting element of the protection element is slid. During explosion load thereby a transmission should be by form closure ensured. With at least securing means for example with at least a screw the protective element becomes fixed. By to the circumstances chassis adapted form of the protective element and the corresponding dimensioning of the securing means can become damages at the mounting plates due to the use of the vehicles in the area to a large extent avoided. With an explosion of an explosive below the protective element this deformed (D becomes. h. it experiences a deflection). As succession of it a bending moment affects the mounting plates. Because the mounting plates themselves are sufficient strong formed, they deform not, but transmitted moment on chassis. Thus a bypass of the deformation forces is on entire chassis the ensured and the hazard for damages at the vehicle is considerably reduced.

[0015] In an other embodiment of the support this has a C-shaped embodiment. The longer free leg is at the side wall chassis of the mounted and the shorter free leg by the connecting element of the protection element is embraced. Preferably the connecting elements become monolithic formed at the protective element. Besides also an embodiment of the connecting elements is more conceivable as independent elements. The independent connecting element must be however in such a manner formed that the used securing means no high loads affect. To the fixation of the protection element also here at least securing means per support are provided. In a preferable embodiment the connecting elements in longitudinal direction of the protective elements, on the direction of travel of the vehicle are based, u-shaped formed to the support of the fixation of the protective elements, in particular with the use of the vehicle in the area, so that the mounting plates lateral are embraced. If a possible displacement of the protection element becomes by projecting members chassis, for example foregoing wheel housings to a large extent prevented, the connecting element of the protection element can be as straight connection-lax formed. Without an u-shaped embodiment of the connecting element, which embraces the support, can be done. If a possible displacement of the protection element becomes as for example described above prevented, the support can become also z-shaped designed. A free leg at that becomes chassis attached and the second free leg serves the fixation of the protective element.

[0016] Other embodiments of the mounting plates are more conceivable. Depending upon moulding chassis become the mounting plates so adapted that they are suitable to the transmission of forces and torques. Substantial one is that entire chassis to the ingestion of the resultant forces and/or. Deformation energies, in particular with an explosion of an explosive used becomes.

[0017] In a variant to the fixation or the protective elements with attachment elements clamping elements can become provided. The mounting plates are preferably thereby as a type clip formed, whereby the pushed in protective elements in a certain sense are embraced. With the clamping elements it concerns for example wedging elements, which are driven between that chassis and that or the protective elements and these to strut with one another in such a way, which leads to a desired fixation. Since the fixation should be more releasable, for example the driven wedge member is to be arranged in such a manner that it can be driven out light against the original driving direction. Prefered ones become as wedging elements a

combination of a tube with a wedge used. The tube shifted between the protective element and the ground of the vehicle with a wedge one floats apart, as the wedge is hit.

[0018] Instead of training separate mounting plates, which become at that chassis attached and which protective elements to embrace in such a manner that these strained to become to be able, can that chassis themselves projecting members be exhibited, rear which the protective element be pushed in can. Chassis can be separate projecting members arranged to. More other can become also already present projecting members, as for example wheel housings or similar one used and if necessary in such a manner enlarged that the pushed in protective elements come to be appropriate rear for these and with that chassis with wedging elements strained to become to be able.

[0019] From the subsequent description of detail and the entirety of the claims other favourable embodiments result and characteristic combinations of the invention.

Brief description of the drawings

[0020] The designs used to the explanation of the embodiment show:

Fig. 1 A schematic cross section by a tub-shaped vehicle chassis with a protective element according to invention;
Fig. 2a a detail cut of a first preferable embodiment of the invention;
Fig. 2b a perspective view that bottom fig 2 described arrangement;
Fig. 3a a detail cut of an arrangement with a C-shaped support;
Fig. 3b a perspective view that bottom fig 3 described arrangement;
Fig. 4 a detail cut of an arrangement with a z-shaped support;
Fig. 5 a detail cut by an embodiment, is strained with which the arrangement.
In principle like parts are provided with same numerals in the figs.

Paths to the embodiment of the invention

[0021] On the basis the schematic cross section of the inventive arrangement shown in fig 1 the action principle becomes explained. The ground 1 is provided to the protection of a vehicle, for example a tank, against the action of an explosive, in particular a mine, with a metal plate 2. Between the wheel housings 3,1 and/or. 3.2 on each side of the vehicle becomes mounting plates 4,1 and 4,2 arranged, which the metal plate 2 in the distance (of for the example unite centimeters) to the ground 1 inertial. Per protective element (metal plate 2) are z. B. four or more mounting plates provided. For the connection between the mounting plates 4,1 and/or. 4.2 and the metal plates 2 is suitable securing means provided. The mounting plates 4,1 and/or. 4.2 is at the ground 1 and to (in Fig. 1 oblique inclined represented) side walls 5,1 and/or. 5.2 of the vehicle in such a manner attached that with a load of the mounting plates 4,1 and 4,2 these with the side walls 5,1 and 5,2 and the ground 1 cooperate. With the type of the attachment of the mounting plates 4,1 and/or. it can concern 4.2 for example a welding or a screw connection. The metal plate 2 can on several kinds with the support 4,1 and/or. 4.2 connected its. In a preferable embodiment the support 4,1 points and/or. 4.2 a recess up, which serves a corresponding formed the connection-lax metal plate 2 for the ingestion. In the figs 2 to 5 these and other variants of the interface of the metal plate become 2 described with the support 4,1 in the detail.

[0022] Result from the action for example to an exploding mine in such a way large forces that itself the mounting plates 4,1 and/or. 4.2 of the metal plate 2 to deform wants, then the forces are on the side walls 5,1 and/or. 5.2 transmitted become. Preferably the ground 1 forms a closed frame with the side walls 5,1 and 5,2 and the structure of the vehicle (here not shown). By will it possible taking over higher forces by the entire vehicle than this with an attachment of protective elements of the known type the case is.

[0023] By the deformation of the metal plate 2 with the action for example an exploding mine shortened itself these. 4,2 affects the connection-lax metal plate 2 the mounting plates 4,1 and. From this reason the mounting plates must become 4,1 and 4,2 such solid formed that they can resist these force effects and introduce the simultaneous forces into the side walls 5,1 and 5,2 and in a smaller measure into the ground 1. Thus also the technical boundary conditions for the type of mounting are set. The attachment of the support 4,1 and/or. 4.2 at the side walls 5,1 and/or. 5.2 and at the ground 1 in such a manner formed must be that on the one hand the support 4,1 and/or. 4.2 due to the action one does not tear off and on the other hand the forces major into the side walls 5,1 and/or. 5.2 initiated become. With the embodiment of the mounting plates 4,1 and 4,2 is to be made certain that as much surface is available as possible, around the forces to transmitted. The recesses/increases already present in the ground 1 of the vehicle are shared favourably.

[0024] The principle is more applicable on all vehicles, at a which outside protective element arranged becomes.

[0025] In fig 2 is a detail cut of a preferable embodiment of the arrangement shown. With this the support is 4,1 at the side wall 5,1 and the ground 1 welded. Apart from this type of mounting also an attachment of the support 4,1 more executable with other securing means as for example screws (not shown) is. If necessary also these securing means forces must be able to take over due to from the outside resultant actions, what is for example to be considered with a dimensioning of the securing means and to a larger cross section of the securing means than this leads with a calculation only on the total weight of the metal plates 2 the case is. The other one so dimensioned securing means become rather deformed. Target is it, the support 4,1 and/or. to out-arrange 4.2 in such a way that by a particular embodiment or utilization of the present embodiment of the ground 1 and the side walls 5,1 and 5,2 the loads on the securing means for the support 4,1 and/or. 4.2 as possible held becomes as small.

[0026] The mounting plates are provided in this embodiment with a recess 6. Preferably this recess 6 is in longitudinal direction, this, continuous arranged based on the direction of travel of the vehicle. In this become the connection-lax 7 introduced, which vertical turns off to the major surface of the metal plate 2 and in their form of complementary to the recess 6 formed is. The whole metal plate 2 becomes between the wheel housings 3,1 the bottom vehicle pushed. Preferably made this insert of ("link") or other ("right") side of the vehicle, related to the direction of travel. The metal plate 2 can however also from the front and/or. in the back, also this on the direction of travel of the vehicle based, to be pushed in. With a lifting device (here not shown) the metal plate becomes 2 raised and in such a manner positioned that it at the mounting plates 4,1 and/or. 4.2 fixed will can. The fixation made with securing means. In the illustrated embodiment the support 4,1 exhibits a recess, becomes 8 introduced in which a screw. Preferably with one the corresponding screw 8 formed threads is provided the connection-lax 7. The here arranged securing means serve mainly the fixation of the metal plate 2. With the fact prevented becomes that the metal plate 2 shifts, if the vehicle in the swampy area sinks and rests upon with the metal plate 2 on the ground. Furthermore the metal

plate becomes simultaneous held in vertical direction (thus against "falling down"). In place of a screw 8 as securing means also a pin can already be sufficient depending upon embodiment and weight of the metal plate. (Naturally also several screws can and/or. Pins used become.)

[0027] Depending upon size of the vehicle and number of the wheels more than a metal plate becomes 2 used per vehicle. Regarding a simple assembly it is from advantage, if the used metal plates are not to heavier. This has effects on the required expedients to the assembly. With to heavy metal plates cannot be done without perhaps even a lifting device, if the metal plate is not to heavier, in order by several persons raised to become. Such an assembly is more executable also in the area simple. The metal plates used as mine protection are z. B. about 80 mm of thick and a wise mass of approx. 300 kg/m2 up. These indications relate itself on empirical values and can vary depending upon vehicle and operating conditions strong. It is not also invention-substantial, which type of protective elements arranged become and are like heavy these. The other dimensions of the metal plates are to that extent of importance, when they depend on the type of the assembly. With the prefered lateral assembly ("lateral" refers here to the vehicle and/or. the direction of travel of the vehicle) must be able be inserted the metal plate between the wheels. The ever large wheel base, the wider can be the metal plate designed. The other one also the embodiment of the ground can have influence on the dimensions of the metal plate, in particular if single projecting members of the ground become strutting the metal plate used.

[0028] Becomes now the metal plate 2 of an action of an explosive exposed, shortened it, like already described. The upper end of the connection-lax 7 presses against the support 4,1 outward, this on the side wall of the vehicle based. The support is however so solid designed that it works against this pressure and pushes away mainly thereby at the side wall 5,1 and in second line at the ground 1. Since with this arrangement for the resultant forces a larger surface opposite an attachment, which only the ground 1 is available for the assumption of the forces used, the forces better distributed can become and the effects of the deformation forces are on the entire vehicle in the comparison smaller.

[0029] Like already the metal plate 2 by the support 4,1 is mentioned and/or. 4.2 also against shifting held. Since vehicles, become arranged at which major such metal plates, in nearly each type of area to be more insertable to have, a metal plate in such a manner held must be that with a so called took up the vehicle no damages, in particular at the mounting plates 4,1 and 4,2 of the metal plate 2 to develop.

[0030] Fig 2a shows a perspective view that bottom fig 2 described arrangement from downside to the ground of the vehicle. The clarity of the arrangement single hidden lines became dotted shown. As one can recognize on the basis this representation, manages the connection-lax 7 over the edge of the ground 1. The connection-lax 7 is L-shaped formed and intervenes in the support 4,1. The recess 6 of the support 4,1 is 5,1 tapered toward to the side wall. In their form of complementary formed connection-lax 7 so guided in this recess 6 used can become, which the positioning of the metal plate 2 facilitated. Two screws 8 as securing means for the metal plate 2 arranged are more other with this embodiment.

[0031] The detail cut in fig 3 shows an arrangement with a support 9, which pictorial exhibits a spoken C-shaped embodiment. The longer free leg 19 of the support 9 becomes 5,1 attached at the side wall. As variant to an attachment with a weld a screw is 10 arranged. During a large load of the single screw 10 several screws can become along the side edge 5,1 and/or

crosswise to it arranged. The shorter free leg 20 of the support 9 serves the ingestion of the connection-lax 11. The metal plate 2 becomes 12 held with a screw, whereby this screw can become 12 also by a feather/spring pin or something similar one replaced, if the total weight of the metal plate permits 2 this. Depending on more than securing means can be arranged also here. The support 9 is such a solid formed, so that the support surface of the support is so large that the forces optimal on the side wall 5,1 and the ground 1 transmitted to become to be able. The metal plate 2 can exhibit also in a range, preferably in the range of the support 9 or even on the whole length of the metal plate 2, a bar 13. This becomes prefered with the terminal ground 1/Seitenwand 5 or in the vicinity of it arranged. To note it remains that prefered none or only small forces in particular affect 10 and on the screw 12 the screw, so that these have a major support function and thus on the total weight of the metal plate 2 dimensioned to become to have. An assumption of the resultant forces with the explosion of an explosive is to be managed hardly only with screws or bolts as securing means. The principal object of these securing means is holding the single metal plates 2 and at the same time the fuse of the metal plate 2 before a displacement, in particular when mounting the vehicle in the area.

[0032] Fig 3a represents a perspective view that to bottom fig 3 described arrangement, with which to the fuse against shifting the metal plate 2 exhibits the connection-lax 11 additional two side portions 14. These embrace the shorter free leg 20 of the support 9. By this measure the loads become 12 considerably reduced on the screw, which smaller dimensions of this screw 12 or comparable securing means allowed.

[0033] With this type of the arrangement the connection-lax 11 can and/or. the metal plate 2 so far over the edge ground/side wall drawn becomes that with the wheel housings 3,1 and/or. 3,2 recesses necessary are, so that the metal plates 2 mounted to become to be able. If such a recess becomes scarcely performed, one of the metal plates became 2 these to the outer edge of the wheel housings 3,1 and/or with a displacement. 3.2 push, so that the freedom of movement of the metal plates would be 2 additional limited. Also this leads 2 at the mounting plates 4 to a relief of the single attachment elements with the attachment of the metal plate.

[0034] In fig 4 a detail cut of an arrangement with a z-shaped support is 16 shown. The shorter free leg 21 of this support 16 is toward the metal plate 2 aligned and the connection-lax 11 becomes with the screw 12 to it attached. Even if a bar becomes 13 arranged here, the shorter free leg 21 up to this bar 13 preferably runs. In this embodiment the use of a feather/spring pin is to be preferred opposite a screw, since the space conditions for setting a tool in the cavity 17, which due to the arrangement of the metal plate 2, in particular if a bar is 13 present, and for the support 16 develops, are scarce. The assumption of the resultant forces with the explosion of an explosive and the bypass of the forces into the side wall 5,1 the longer free leg becomes 22 5,1 preferably welded at the side wall.

[0035] The represented detail cut in fig 5 shows an embodiment, is strained with which the arrangement. Here it is from relevant importance that the metal plate 2 up to the edge of the wheel housings is 3,1 guided and a possible recess with these wheel housings 3,1 and/or. 3.2 as possible made becomes so scarce. The metal plate 2 exhibits a bar 13, which must be in the range of the wheel housings 3,1 arranged, in addition, can over the whole length regarding the direction of travel of the vehicle arranged to be. The layer regarding the edge 15 arises as a result of the used wedging elements, the dimensions and the embodiment of the wheel housings 3,1 and/or. 3.2. More other also the distance between the outer periphery of the ground has 1 and the inner edge of the metal plate 2 influence on the layer of the bar 13.

Preferably the bar is 13 15 arranged near the edge. Like a tube 18 and a wedge used represented here as wedging elements, which are driven into the tube, becomes exemplary. Thus the metal plate becomes 2 against the edge of the wheel housing 3,1 pressed and so strained. With an explosion of an explosive preferably presses in particular the bar 13 near the edge 15 on the ground 1. Thus a substantial portion of the resultant force becomes 5 derived on the side wall. With this embodiment the used wedging elements must be in such a manner formed that the keying can become disengaged. This can become by the fact ensured that the driven wedge is so prolonged formed that it can be driven out from the other side for example from the tube 18 again.

[0036] In summary found can become that the inventive arrangement on the one hand the protection before exploding explosives, in particular of mines with vehicles considerably increased and on the other hand a releasable connection of the protective elements at the vehicles possible. Nevertheless damages at the mounting plates of the protective elements can become with the use of these vehicles in the area to a large extent excluded. If the protective elements will have required or these replaced no longer will become, they are dismantlable and subsequent again at any time mountable simple.